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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3343
Plant ID No.:	051-00061
Applicant:	Primus Green Energy, Inc.
Facility Name:	Marcellus Methanol Plant
Location:	Proctor, Marshall County
NAICS Code:	32519
Application Type:	Construction
Received Date:	October 6, 2016
Engineer Assigned:	Steven R. Pursley, PE
Fee Amount:	$2.000.00
Date Received:	October 6, 2016
Complete Date:	October 21, 2016
Due Date:	January 19, 2017
Applicant Ad Date:	October 10, 2016
Newspaper:	*Moundsville Daily Echo*
UTM's:	Easting: 514.311 Northing: 4,397.604 Zone: 17
Description:	Methanol Production Facility

DESCRIPTION OF PROCESS

Marcellus Methanol is proposing to construct a facility in Marshall County near Proctor. This facility will have a nameplate production capacity of approximately 160 metric tons (176 tons) per day of methanol, using natural gas as feedstock.

Primus has developed a proprietary technology for converting various feedstocks, including, natural gas, into liquid fuels and chemicals, including gasoline and methanol. The proposed project will utilize Primus' gas-to-methanol system to produce 160 metric tpd of International Methanol Producers & Consumers Association (IMPCA) specification methanol from pipeline natural gas supplies sourced from the Marcellus shale region.

The project will be comprised of the following equipment:

- One Steam Methane Reformer (SMR) system (natural gas-fired) equipped with selective catalytic reduction (SCR) for nitrogen oxides (NO_x) emissions control;
- One methanol synthesis reactor system and off-gas recovery system;
- One methanol distillation system and off-gas recovery system;
- One start-up heater;
- Three methanol storage tanks; and
- Truck and rail loading racks (one each) equipped with a flare for volatile organic compounds (VOC) emissions control.

Steam Methanol Reformer

The SMR produces syngas from pipeline natural gas and steam feedstocks, and requires heat which is supplied by the combustion of natural gas and process gases. The SMR consists of a reactor where synthesis gas (syngas) is produced by a reaction of natural gas and steam, and a boiler where fuel is combusted to supply heat for the reaction and for producing steam. The fuel used in the boiler includes pipeline natural gas and recovered hydrogen-rich process gases from the methanol reactor system and methanol distillation system.

Combustion emissions from the SMR boiler will be exhausted to a selective catalytic reduction (SCR) unit for NO_x emissions control. The SMR reactor, which normally operates under high pressure, is not normally exhausted to atmosphere. On rare occasions, startup conditions and upset conditions will result in syngas releases with four such startup events per year and four such upset events per year conservatively assumed for the purposes of this permit application. The syngas present in the SMR reactor during startups and process upsets would be vented to a process header which is in turn vented to a flare for control of emissions.

Methanol Synthesis Reactor System

The methanol synthesis reactor system consists of a series of reactor vessels that convert the syngas to a crude methanol liquid stream comprised of approximately 80 to 85 percent methanol and water. The system includes off-gas recovery, most of which is recycled to the front end of the methanol reactor system. A smaller hydrogen-rich process gas stream (HP Vent) is directed to the SMR furnace where it serves as fuel. The methanol synthesis reactor system, which normally operates under high pressure, is not normally

exhausted to atmosphere. For facility startups and for emergency purposes, the reactor system is tied to the process header which is in turn vented to a flare for control of emissions. Startup venting will be of a duration of less than 4 hours and is expected to occur no more than 4 times per year.

Methanol Distillation System

The methanol distillation system consists of a series of distillation columns that purify the crude methanol to IMPCA-specification methanol. A small stream of process gas (LP Vent), comprised mostly of methane, methanol, hydrogen, and carbon dioxide, is directed to the SMR furnace where it serves as fuel. The methanol distillation system is not normally exhausted to atmosphere. For emergency purposes, the distillation system is tied to the process header which is in turn vented to a flare for control of emissions. The process header would only be used in extremely rare circumstances, such as during a fire that engulfs the methanol distillation system.

Methanol Storage

Methanol storage will be comprised of the following:

- One 30,000 barrel (bbl) (24-day storage) carbon steel, 80 foot diameter by 40 foot high methanol product storage tank equipped with internal floating roof.
- One 30,000 gallon shift tank (cylindrical horizontal double-walled aboveground) to store methanol product from distillation, prior to transfer into the methanol product storage tank.
- One 30,000 gallon off-spec tank (cylindrical horizontal double-walled aboveground) to store methanol deemed as off-specification.

Methanol Loadout

Methanol loadout will be comprised of the following:

- One 400 gallon per minute (gpm) loading rack for filling trucks in dedicated methanol service.
- One 800 gallon per minute (gpm) loading rack for filling railcars in dedicated methanol service.

Vapors displaced from the trucks and railcars during loading will be directed to an enclosed flare for VOC emissions control. This flare is different from the one used for startups and emergency purposes.

Cooling Tower

An induced draft evaporative cooling tower will provide cooling of process water for the project. The tower will be of rectangular mechanical-draft design with two cells. The water flow rate will be approximately 2,000 gallons per minute, with a drift loss of 0.005 percent. Total dissolved solids in the water are expected to be approximately 5,000 mg/l.

Startup Heater

The facility will include a 2.55 MMBtu/hr startup heater to provide heat to the methanol synthesis reactor system during startups. The startup heater will combust only natural gas. Although the unit will be used only during facility startup conditions, the unit is assumed to operate 8,760 hours per year for permitting purposes.

SITE INSPECTION

The proposed site is located within the boundaries of the larger, existing Covestro chemical production complex located adjacent to the Ohio River in the southwestern corner of Marshall County, approximately 5 miles north of the city of New Martinsville and 1.3 miles north of the unincorporated community of Proctor. A CSXT rail corridor runs adjacent to the river, along the west side of the larger complex. State Highway 2 runs along the east side of the larger complex. Additional industrial complexes are located to the north on the West Virginia side of the river, and to the south on the Ohio side. Because the facility will be located at a well known, existing industrial facility no site inspection was deemed necessary.

To get to the facility take I77 north to exit 176. Then take US Route 2 north for approximately 50 miles. The Covestro plant entrance is on the left.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Steam Methane Reformer

Combustion emissions from the SMR were calculated based on the maximum hourly heat input (114.8 MMBtu/hr) of the unit and vendor-supplied emissions data. Emissions

of HAPs were calculated based on USEPA's AP-42 for natural gas-fired boilers. The SMR will be equipped with selective catalytic reduction (SCR) for NO_X emissions control.

On rare occasions, such as startup and upset conditions, syngas will be released to a flare (SSM flare) dedicated for control of releases during such events.

Startup Heater

A startup heater with a maximum heat input capacity of 2.55 MMBtu/hr will be used to provide heat to the methanol synthesis reactor system during plant startups. The startup heater will use natural gas and for air permitting purposes is conservatively assumed to operate at full capacity year-round. Combustion emissions were calculated based on the maximum heat input capacity of the heater and USEPA's AP-42 emission factors for natural gas-fired boilers.

Methanol Synthesis Reactor and Distillation Systems

The methanol synthesis reactor and distillation systems do not have direct discharges to atmosphere during normal facility operations. Hydrogen-rich gases are recovered from these systems during normal operations and returned to the SMR for combustion. The calculated SMR combustion emissions includes consideration of these vent gases.

For the purposes of evaluating worst-case SSM emissions, a release of methanol from these systems to the SSM Flare was considered. Emissions from such a process upset are described below in the discussion of the SSM Flare.

Product Storage

VOC emissions from the methanol storage tank, shift tank, and off-spec tank were calculated using USEPA's TANKS 4.0.9d software (USEPA, 2001a). The methanol storage tank will be equipped with an internal floating roof and is assumed to handle the full production capacity of the facility. The methanol shift tank and off-spec tank will be of identical horizontal tank design and will share the full production capacity of the facility. Because of their identical designs, emissions for only one of the horizontal tanks at full production throughput was calculated. These emissions are representative of the combined emissions of both tanks.

Product Loadout

Product will be loaded onto tank trucks at a rate of 400 gallons per minute (gpm) and onto railcars at a rate of 800 gpm. Vapors displaced from the trucks and railcars will be exhausted directly to a flare dedicated for control of loadout emissions (Loadout Flare). Submerged fill techniques are assumed to be employed, and the trucks and railcars are assumed to be in dedicated methanol service. Displaced methanol vapor emissions were calculated using USEPA's AP-42, Section 5.2 (USEPA, 1995a). The captured VOC and HAP emissions will be destroyed in the Loadout Flare with a control efficiency of 98%.

The Loadout Flare will have a pilot that will combust natural gas. The pilot will have a capacity of 0.06 MMBtu/hr (1.0 scfm) and was assumed to operate 8,760 hours per year. Combustion emissions of criteria pollutants for pilot operation were calculated using USEPA's AP-42, Section 13.5 (USEPA, 1995b). PM emissions were calculated by conservatively assuming a lightly smoking flare.

SSM Flare

The SSM Flare will be used to control gases released during facility startups and process area upsets. The flare will use natural gas for the pilot. Annual potential emissions assume full year round operation of the pilot and a conservative estimate of releases from SSM events. It should be noted that the applicant calculated emissions for upset conditions which, per WVDAQ policy, are generally not included in permits. Therefore, this evaluation and subsequent permit will only address facility startups (Scenario 1). During startups the system is initially filled with hot nitrogen to bring the equipment up to operating temperature. As the SMR commences syngas production, a mixed stream of nitrogen and syngas is sent to the SSM Flare for control of emissions until the nitrogen is purged from the system and the system switched to normal operating mode.

Cooling Tower

A mechanical draft cooling tower will provide cooling of process water for the project. The maximum design flow rate will be approximately 2,000 gallons per minute (GPM). Total dissolved solids in the cooling water are expected to be approximately 5,000 milligrams per liter (mg/l). The cooling tower will be designed with a drift rate of 0.005 percent or less to minimize PM_{10} emissions. The cooling tower will use a total of two cells.

Emissions were calculated using USEPA's AP-42, Section 13.4 (USEPA, 1995c). The total $PM_{2.5}$ emissions were set equal to the PM_{10} emissions.

VOC emissions resulting from heat exchanger process fluid leaks into cooling water were calculated in accordance with the South Coast Air Quality Management District's (SCAQMD) "Guidelines for Calculating Emissions from Cooling Towers" (SCAQMD, 2006). Because Marcellus Methanol is proposing to perform weekly monitoring of VOCs in the cooling water, the emission factor that claims credit for VOC control was used. The calculated VOC and HAP emissions are comprised entirely of methanol.

Fugitive VOC Equipment Leaks

Fugitive VOC emissions from equipment leaks were calculated in accordance with USEPA's "Protocol for Equipment Leak Emission Estimates" (USEPA, 1995d) using SOCMI emission factors. Component counts were estimated from preliminary engineering drawings of the proposed facility.

Emissions Summary

Using the above methods, controlled emissions from the facility were calculated to be as follows:

	$PM/PM_{2.5}$		SO_2		NO_x		CO		VOCs		HAPs	
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
SMR	0.45	1.97	0.27	1.18	15.27	66.90	4.49	19.68	0.90	3.94	0.45	1.96
Heater	0.02	0.08	0.01	0.01	0.25	1.10	0.21	0.92	0.02	0.06	0.01	0.02
Tanks	--	--	--	--	--	--	--	--	0.65	2.02	0.65	2.02
Prod. Load. (incl. flare)	0.01	0.03	0.01	0.01	0.18	0.81	0.98	4.39	1.26	0.17	1.26	0.17
SSM Flare[1]	0.02	0.02	0.01	0.01	0.42	0.04	2.26	0.17	0.86	0.07	0.86	0.07
Cool. Tower	0.25	1.10	--	--	--	--	--	--	0.08	0.37	0.08	0.37
Equip. Leaks	--	--	--	--	--	--	--	--	0.70	2.55	0.66	2.42
Total	**0.75**	**3.20**	**0.30**	**1.21**	**16.12**	**68.85**	**7.94**	**25.16**	**4.47**	**9.18**	**3.97**	**7.03**

[1]Includes only emissions from pilot light and an estimated four start ups per year. Excludes emissions that occur during any malfunctions. Additionally, the applicant provided no emission estimate for HAPs from the flare. Therefore, the writer conservatively set them to equal VOC emissions.

Speciated HAP emissions from the facility will be as follows (only HAPs emissions that equal or exceed 0.01 tpy are included).

	Formaldehyde	n-Hexane	Methanol
	tpy	tpy	tpy
SMR	0.08	1.87	--
Heater	0.01	0.02	--
Tanks	--	--	2.02
Prod. Load. (incl. flare)	--	--	0.17
Cooling Tower	--	--	0.37
Equipment Leaks	--	--	2.42
Total	**0.09**	**1.89**	**4.98**

REGULATORY APPLICABILITY

The proposed Marcellus Methanol Plant is subject to the following substantive state and federal air quality rules and regulations: 45CSR2, 45CSR6, 45CSR7, 45CSR10, 45CSR13, and 40 CFR 60 Subparts Kb, VVa, NNN, and RRR. Each applicable rule and USM's compliance therewith will be discussed in detail below.

45CSR2: To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers

Pursuant to the definition of "fuel burning unit" under 45CSR2 ("producing heat or power by indirect heat transfer"), 45CSR2 will apply to the proposed 114.8 mmBtu/hr SMR boiler and the 2.55 mmBtu/hr start up Heater and they are, therefore, subject to the applicable requirements therein. However, pursuant to the exemption given under §45-2-11, as the MDHI of the start up Heater is less than 10 mmBtu/hr, the unit is not subject to sections 4, 5, 6, 8 and 9 of 45CSR2. The only remaining substantive requirement is under Section 3.1 - Visible Emissions Standards. Each substantive 45CSR2 requirement is discussed below.

45CSR2 Opacity Standard - Section 3.1

Pursuant to 45CSR2, Section 3.1, both heaters are subject to an opacity limit of 10%. Proper maintenance and operation of the heaters (and the use of natural gas/syngas as fuel) should keep the opacity of the units well below 10% during normal operations.

45CSR2 Weight Emission Standard - Section 4.1(b)

The allowable particulate matter (non-condensable total particulate matter) emission rate for the SMR boiler, identified as a Type “b” fuel burning unit, per 45CSR2, Section 4.1.a, is the product of 0.09 and the total design heat input of the heater in million Btu per hour. The maximum aggregate design heat input (short-term) of the SMR boiler will be 114.8 mmBtu/hr. Using the above equation, the 45CSR2 particulate matter emission limit of the heater will be 10.3 lb/hr. The maximum potential hourly PM emissions from the heater is estimated to be 0.45 lb/hr. This emission rate is 4.4% of the 45CSR2 limit.

45CSR2 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of Rule 2 requires testing for initial compliance with the limits therein, monitoring for continued compliance, and keeping records of that compliance. The TMR&R requirements are clarified under 45CSR2A and discussed below.

45CSR2A Applicability - Section 3

Pursuant to §45-2A-3, as an individual applicable “fuel burning unit” under 45CSR2 with an MDHI less than 100 mmBtu/hr, the start up Heater is not subject to the Testing and MRR Requirements under 45CSR2A. Additionally, pursuant to §45-2A-3.1(a), a “fuel burning unit(s) which combusts only natural gas shall be exempt from sections 5 and 6.” Per the Director's discretion, as the SMR boiler only combusts natural gas and syngas (made from natural gas) with a very low potential for particulate matter emissions, the unit will be exempt from sections 5 and 6. The SMR boiler must, however, meet the applicable record-keeping and reporting requirements under Section 7.

45CSR6: To Prevent and Control Particulate Air Pollution from Combustion of Refuse

Primus has proposed flaring for control of various waste gas streams (see above). The flares meet the definition of an "incinerator" under 45CSR6 and are, therefore, subject to the requirements therein. The substantive requirements applicable to the flares are discussed below.

45CSR6 Emission Standards for Incinerators - Section 4.1

Section 4.1 limits PM emissions from incinerators to a value determined by the following formula:

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

Where, the factor, F, is as indicated in Table I below:

Table I: Factor, F, for Determining Maximum Allowable Particulate Emissions

Incinerator Capacity	Factor F
A. Less than 15,000 lbs/hr	5.43
B. 15,000 lbs/hr or greater	2.72

The SSM flare's (Flare02) maximum listed hourly capacity in the application is 19,729 lbs/hour (9.86 tons/hr). Using this value in the above equation produces a PM emission limit of 26.83 lb/hr. When operating correctly, there is expected to be only trace amounts of particulate matter from the flare and, therefore, the flare shall easily meet this limit. Primus estimated that up to a worst-case of 0.55 lbs/hour of particulate matter emissions could be emitted from the flare during malfunctions. This is far below the 45CSR6 limit.

The loading flare's (Flare01) maximum listed hourly capacity in the application is 9,625 scf/hr. Converting (1.19804 moles/scf), this equals 11,531 moles per hour. The Air Pollution Device Sheet lists the molecular weight of the waste stream as 30 lb/lb mole. Multiplying that molecular weight by 1 pound mole per 453.59 moles equals 0.066 pounds per mole. This results in 761 pounds (0.3805 tons) of waste gas per hour. Using this value in the above equation produces a PM emission limit of 2.06 lb/hr. When operating correctly, there is expected to be only trace amounts of particulate matter from the flare and, therefore, the flare shall easily meet this limit. Primus estimated that up to a worst-case of 0.01 lbs/hour of particulate matter emissions could be emitted from the flare. This is far below the 45CSR6 limit.

45CSR6 Opacity Limits for - Section 4.3, 4.4

Pursuant to Section 4.3, and subject to the exemptions under 4.4, the flares will have a 20% limit on opacity during operation. Proper design and operation of the flare should prevent any substantive opacity from the unit.

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides

45CSR10 has requirements limiting SO_2 emissions from "fuel burning units," limiting in-stack SO_2 concentrations of "manufacturing processes," and limiting H_2S concentrations in process gas streams. Both the SMR boiler and startup Heater are defined as a "fuel burning unit" ("producing heat or power by indirect heat transfer") under 45CSR10 and are, therefore, potentially subject to the applicable requirements therein. However, pursuant to the exemption given under §45-10-10.1, as the MDHI of the startup Heater is less than 10 mmBtu/hr, the unit is not subject to the limitations on fuel burning units under 45CSR10.

45CSR10 Fuel Burning Units - Section 3

The allowable SO_2 emission rate for the SMR boiler (located in Region I), identified as a Type "b" fuel burning unit, per 45CSR10, Section 3.1(e), is the product of 3.1 and the total design heat input of the heater in million Btu per hour. The maximum aggregate design heat input (short-term) of the boiler will be 114.8 mmBtu/hr. Using the above equation, the 45CSR10 SO_2 emission limit of the boiler will be 355.88 lb/hr. The maximum potential hourly SO_2 emissions from the boiler is estimated to be 0.27 lb/hr. This emission rate is only a trace of the 45CSR10 limit.

45CSR10 Process Gas Stream Combustion - Section 5

Section 5.1 of 45CSR10 prohibits the combustion of any "refinery process gas stream" that contains H_2S in excess of 50 grains for every 100 cubic feet of tail gas consumed. The syngas stream that is combusted in the SMR boiler could be defined as a refinery process gas stream. However, according to information in the permit application, (Attachment N, page 4, lists a sulfur content specifically for the natural gas fraction only) there is no measurable amount of H2S in the syngas stream.

45CSR10 Testing, Monitoring, Record-keeping, & Reporting (TMR&R) - Section 8

Section 8 of Rule 10 requires to test for initial compliance with the limits therein, monitor for continued compliance, and keep records of that compliance. The TMR&R requirements are clarified under 45CSR10A and discussed below.

45CSR10A Applicability - Section 3

Pursuant to §45-10-3, as an individual applicable "fuel burning unit" under 45CSR10 with an MDHI less than 100 mmBtu/hr, the startup Heater is not subject to the Testing and MRR Requirements under 45CSR10A. Pursuant to §45-10A-3.1(b), for heaters that combust "natural gas, wood or distillate oil, alone or in combination," the units are not subject to the Testing and MRR Requirements under 45CSR10A. Similar to the discussion above under the 45CSR2, per the Director's discretion, as the SMR boiler only combust natural gas and syngas cleaned of any substantive amount of sulfur compounds, no SO_2-specific testing, monitoring or record-keeping of the cracking furnaces will be required.

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The proposed construction of the Marcellus Methanol Plant has the potential to emit a regulated pollutant in excess of six (6) lbs/hour and ten (10) TPY (see above) and,

therefore, pursuant to §45-13-2.24, the proposed facility is defined as a "stationary source" under 45CSR13. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction . . . and operation of any stationary source to be commenced without . . . obtaining a permit to construct." Therefore, Primus is required to obtain a permit under 45CSR13 for the construction and operation of the proposed facility.

As required under §45-13-8.3 ("Notice Level A"), Primus placed a Class I legal advertisement in a "newspaper of general circulation in the area where the source is . . . located." The ad ran on October 10, 2016 in the *Moundsville Daily Echo* and the affidavit of publication for this legal advertisement was submitted on October 21, 2016.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration - ***(NON APPLICABILITY)***

The proposed Marcellus Methanol Plant is a source listed under §45-14-2.43.a (Chemical Process Plants) and, therefore pursuant to 2.43.b., is defined as a "major stationary source" if any regulated pollutant has a potential-to-emit in excess of 100 TPY. The facility does not have a potential-to-emit of any regulated pollutant in excess of 100 TPY and is, therefore, not defined as a major stationary source and is not subject to the provisions of 45CSR14.

45CSR30: Requirements for Operating Permits

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The proposed Marcellus Methanol Plant does not meet the definition of a "major source under §112 of the Clean Air Act" as outlined under §45-30-2.26 and clarified (fugitive policy) under 45CSR30b. The proposed facility-wide PTE (see above) of any regulated pollutant does not exceed 100 TPY. Additionally, the facility-wide PTE does not exceed 10 TPY of any individual HAP or 25 TPY of aggregate HAPs.

However, as the facility is subject to various New Source Performance Standards (NSPS) that do not contain a Title V permitting exemption, the proposed facility is subject to Title V as a non-major source. Non-major sources subject to Title V, pursuant to DAQ policy, are deferred from having to submit a Title V application but still pay annual fees pursuant to submission of a Certified Emissions Sheet (CES).

40 CFR 60, Subpart Db: Standards of Performance for Small Industrial - Commercial - Institutional Steam Generating Units - **(NON APPLICABILITY)**

40 CFR 60 Subpart Db is the New Source Performance Standard (NSPS) for industrial-commercial-institutional steam generating units for which construction, modification, or reconstruction is commenced after June 19, 1984 and that have a maximum design heat input capacity greater than 100 mmBtu/hr. The definition of "steam generating unit," however, specifically exempts "process heaters." The definition of process heaters means "a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst." The SMR boiler meets this definition of a process heater and is, therefore, not subject to Subpart Db.

40 CFR 60, Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Subpart Kb of 40 CFR 60 is the NSPS for storage tanks containing Volatile Organic Liquids (VOLs) which construction commenced after July 23, 1984. The Subpart applies to storage vessels used to store volatile organic liquids with a capacity greater than or equal to 75 m3 (19,813 gallons). However, storage tanks with a capacity greater than or equal to 151 m3 (39,890 gallons) storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or with a capacity greater than or equal to 75 m3 but less than 151 m3 storing a liquid with a maximum true vapor pressure less than 15.0 kPa are exempt from Subpart Kb.

Primus is proposing three (3) storage tanks for the facility. Subpart Kb will apply to the 1.26 million gallon methanol storage tank (EU05) as its capacity is greater than 19,813 gallons and is used to store volatile organic liquids. In addition, the storage tank does not meet the exemption in 60.110b(b) because its capacity is greater than 39,890 gallons and methanol has a maximum true vapor pressure greater than 0.51 psia at the site.Pursuant to §60.112b(a), Subpart Kb requires storage tanks with capacities in excess of 39,890 gallons and which store a VOL with a vapor pressure between 5.2 kPa and 76.6 kPa to comply with one of three control options:

(1) A fixed roof in combination with an internal floating roof;

(2) An external floating roof; or

(3) A closed vent system and control device designed and operated to reduce inlet VOC emissions by 95 percent or greater.

The facility will comply with Subpart Kb by installing an internal floating roof tank in accordance with 60.112b.

The 1.26 million gallon methanol storage tank will also require inspections of the tank, the internal floating roof, and its seals [§60.113b(a)]. In addition, §60.115b(a) requires Marcellus Methanol to keep records and submit reports regarding the control equipment installed to meet the requirements of §60.112b and inspections conducted under §60.113b(a).

Subpart Kb will also apply to the two 30,000 gallon storage tanks (shift tank EU06 and off-spec tank EU07). Each tank has a capacity between 19,813 gallons and 39,890 gallons, storing a liquid with a maximum true vapor pressure of 2.23 psia at 74°F based on monthly average temperature data for Pittsburgh. However, because the shift tanks have a true maximum vapor pressure less than 4.0 psia (27.6 kPa), the shift tank and off-spec tank are not subject to the control requirements listed in 40 CFR 60.112b.

40 CFR 60, Subpart VVa: Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

Subpart VVa applies to "affected facilities in the synthetic organic chemicals manufacturing industry." "Synthetic organic chemicals manufacturing industry" is defined in VVa as an "industry that produces, as intermediates or final products, one or more of the chemicals listed in §60.489." §60.489 lists methanol as an applicable product.

Subpart VVa contains Leak Detection and Repair (LDAR) requirements for all affected facilities at the proposed facility; these affected facilities are defined under Subpart VVa as "the components assembled and connected by pipes or ducts to process raw materials and . . . includes any feed, intermediate and final product storage vessels (except as specified in §60.482–1a(g)), product transfer racks, and connected ducts and piping." Primus will be required to meet the various applicable standards under Vva.

40 CFR, 60, Subpart NNN: Standards of Performance for Volatile Organic Compound (VOC) Emissions From the Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations

Pursuant to §60.660, 40 CFR 60, Subpart NNN applies to "each affected facility designated in paragraph (b) of this section that is part of a process unit that produces any of the chemicals listed in §60.667 as a product, co-product, by-product, or intermediate, except as provided in paragraph (c)." The chemicals listed in §60.667 include methanol and, therefore, Subpart NNN applies to the proposed Primus facility (which includes a distillation unit). The substantive requirements of Subpart NNN are given under §60.662 and apply to "each vent stream on and after the date on which the initial performance test required by §60.8 and §60.664 is completed." Vent stream is defined as "any gas stream discharged directly from a distillation facility to the atmosphere or indirectly to the

atmosphere after diversion through other process equipment. The vent stream excludes relief valve discharges and equipment leaks including, but not limited to, pumps, compressors, and valves. The requirements under §60.662 are to do one of the following:

(a) Reduce emissions of TOC (less methane and ethane) by 98 weight-percent, or to a TOC (less methane and ethane) concentration of 20 ppmv, on a dry basis corrected to 3 percent oxygen, whichever is less stringent. If a boiler or process heater is used to comply with this paragraph, then the vent stream shall be introduced into the flame zone of the boiler or process heater;

(b) Combust the emissions in a flare that meets the requirements of §60.18; or

(c) Maintain a TRE index value greater than 1.0 without use of VOC emission control devices.

Because the distillation area has a vent stream routed to the SMR, Subpart NNN applies to the project. Combustion of the vent stream in the SMR will reduce TOC emissions by 98 percent. Thus, the project will meet the emissions requirements of Subpart NNN.

40 CFR 60, Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes

Pursuant to §60.700, 40 CFR 60, Subpart RRR applies to "each affected facility designated in paragraph (b) of this section that is part of a process unit that produces any of the chemicals listed in §60.707 as a product, co-product, by-product, or intermediate, except as provided in paragraph (c)." The chemicals listed in §60.667 include methanol and, therefore, Subpart RRR applies to the proposed Marcellus Methanol facility. The substantive requirements of Subpart RRR are given under §60.702 and apply to "each vent stream on and after the date on which the initial performance test required by §60.8 and §60.704 is completed." Vent stream is defined as "any gas stream discharged directly from a distillation facility to the atmosphere or indirectly to the atmosphere after diversion through other process equipment. The vent stream excludes relief valve discharges and equipment leaks including, but not limited to, pumps, compressors, and valves. The requirements under §60.702 are to comply with one of the following:

(a) Reduce emissions of TOC (less methane and ethane) by 98 weight-percent, or to a TOC (less methane and ethane) concentration of 20 ppmv, on a dry basis corrected to 3 percent oxygen, whichever is less stringent. If a boiler or process heater is used to comply with this paragraph, then the vent stream shall be introduced into the flame zone of the boiler or process heater;

(b) Combust the emissions in a flare that meets the requirements of §60.18; or

(c) Maintain a TRE index value greater than 1.0 without use of VOC emission control devices.

Primus has chosen to comply with the Subpart RRR by reducing TOC by 98% by weight.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the proposed Marcellus Methanol Plant and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM_{10} and $PM_{2.5}$), and Sulfur Dioxide (SO_2). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. According to information in the permit application, the only HAPs that will be emitted in any substantive amount (at least 20 pounds per year) at the proposed Marcellus Methanol facility methanol, formaldehyde and hexane. The following table lists the carcinogenic risk (as based on analysis provided in the Integrated Risk Information System (IRIS)):

HAPs	Type	Known/Suspected Carcinogen	Classification
Methanol	VOC	No	Not Assessed
n-Hexane	VOC	No	Group D-Not Classifiable
Formaldehyde	VOC	Yes	Group B1 - Probable Human Carcinogen

AIR QUALITY IMPACT ANALYSIS

Because this application addresses the construction of a non major source (per 45CSR14) no modeling was performed.

MONITORING OF OPERATIONS

The permit will require Primus to maintain the following records:

* The amount of natural gas and process gas combusted by the SMR.

* The amount of ammonia injected into the SCR.

* The methanol throughput for each of the three tanks.

* The presence of a pilot flame shall be continuously monitored using a thermocouple or any other equivalent device to detect the presence of a flame when emissions are vented to either of the flares.

* The permittee shall continuously monitor the circulating water flow rate of the cooling tower.

* The permittee shall take a grab sample of the cooling tower circulating water and analyze on a weekly basis to determine the total solids content of the cooling tower circulating water. Upon request of the permittee, the Director may change the frequency of the testing under this section to a monthly basis once enough data has been established to verify compliance.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of a Permit Number R13-3343 to Primus Green Energy, Inc. for the proposed construction and operation of the Marcellus Methanol Plant located near Procter, Marshall County, WV.

Steven R. Pursley, PE
Engineer

January 10, 2017